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AUTHOR Garrard, Judith; Peng, Grace
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ABSTRACT

This paper consists of a preliminary report of the first-year internship/residency characteristics and end-of year performance evaluation of the initial class of three-year medical student graduates (N=23) from the University of Minnescta Medical School. Students are described in terms of demographic characteristics upon entrance, performance during medical school, and success or failure in the National Internship and Resident Matching Program. The instrument used to evaluate graduate performance is described, together with an index derived by multiple linear regression analysis. A categorization scheme for three-year curricula is summarized, and the need to eventually synthesize data is discussed. (Author)

PRELIMINARY REPORT OF INTERNSHIP/RESIDENCY CHARACTERISTICS AND PERFORMANCE OF THREE YEAR MEDICAL SCHOOL GRADUATES

Judith Garrard and Grace Peng
University of Minnesota Medical School

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Dr. Judith Garrard
Curriculum Evaluator
Box 33 Mayo Hospital
University of Minnesota
Medical School
Minneapolis, Mn. 55455

ED104280

During the past decade medical schools throughout the U.S. have experienced numerous changes in their educational makeup. One of the more interesting of these from the standpoint of the potential quantity of physicians and quality of their clinical performance is the opportunity for entering medical students to complete the requirements leading to the M.D. degree in three rather than the traditional four calendar years. On a national basis, assessment of the effects of this change will be delayed several years until graduates of such programs have completed their medical training and entered clinical practice. During the interim, progress reports may prove useful as formative evaluation, and thus may facilitate some kinds of short term decision making.

This paper is one of a series of evaluation reports on three-year graduates from the University of Minnesota Medical School, and consists of a preliminary report of the first-year internship/residency characteristics and general performance of the initial class. Where comparable data are available, comparisons are made with four-year graduates from the same entering class. A clinical composite index used to evaluate the internship/residency performance is described, and the results of psychometric work based on performance evaluation of previous graduates are discussed.

The Three Year Curriculum

In informal discussions among members of different medical schools about "the three-year curriculum", there is frequently the implication that most programs are similar in format, if not in content. Closer examination reveals, however that there is considerable diversity in the ways in which these programs are being implemented. (See the AAMC publication on medical school admission requirements (1).) For this reason it is essential that the characteristics of a program be described prior to examining its effects on participants or graduates. On the other hand, if the goal of research in this area is to study the impact of three-year curricula in general, then individual program descriptions accomplish little in themselves. Rather what is needed, in addition to description, is a method of classifying programs as a means of putting into perspective the data emerging from them. A categorization scheme based on major sources of diversity in three-year curricula as they are currently being implemented has been proposed elsewhere (2) and is summarized in Fig. 1 of this paper. The most obvious source of variation, that of curriculum content, is not included in this scheme since each program is assumed to be unique in this respect. Hopefully, as the scheme is refined through use in the field, this source will be added in the future.

Basically three-year curricula appear to differ in the type of program, method of curriculum reduction, and method of student selection. Within a medical school, the type of program is either regular, in which the total curriculum is taught to all students in three years, or optional in which both 3 and 4 year programs exist simultaneously. Currently, 14 medical schools have the former; and 17, the later (1). In reducing the traditional 4 year program some schools have chosen to reduce either the content, by eliminating selected course requirements, or time, by compressing the same material into a three year, usually continuous, time period. With the existence of an optional program, there is also the necessity to decide which students will be allowed to participate in the three rather than four year plan. Here the diversity appears to be whether or not student self selection is permitted. In programs where the major responsibility rests with the student, there is usually the contingency that he/she be in satisfactory academic standing. Programs characterized as not permiting self selection are those in which the major decision rests with the faculty or administration. For purposes of classification, programs in which students skip some or all of the first year by virtue of previous coursework or experience are arbitrarily assigned to the "selection by others" category since ultimately the faculty must approve the substitution.

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In the absence of an up-to-date and complete survey of three-year programs along these and similar dimensions, it is difficult to know if all of the major sources of diversity have been included in this categorization scheme. Undoubtedly there will be refinements as we learn more about the characteristics of the programs. The scheme will have served its purpose if the data soon to emerge from the 30 or more programs can eventually be synthesized, and meaningful statements made about the different kinds of three-year programs rather than a summary of the unique results from each. Such a synthesis in the future depends on discussions of individual programs in the present, however.

At the University of Minnesota, both the three-and four-year programs were initiated in fall 1969 in the context of a new curriculum. During the first two years of medical school, students take the same coursework, with the subsequent difference being an additional two academic quarters of clinical electives for four-year students. Thus the three year program is optional and was accomplished mainly through content reduction. Student self selection is permitted, and this decision must be made by fall of the third year in order for internship/residency matching procedures to be initiated. Graduation for all students is conditional upon a satisfactory academic record and successful completion of the National Board Parts I and II exams. The first class of three-year graduates entered internship/residency in Summer 1972; and their four-year classmates in Summer 1973. An evaluation of the first year of graduate performance is available for the three-year graduates and the data are in the process of being gathered for the four-year graduates.

Clinical Composite Index

The evaluation of the first year internship/residency performance of three-year graduates is part of an on-going follow-up program of all Minnesota graduates begun in 1971. In August of each year, a 16-item evaluation form with a 4-point rating scale for each item (see Fig. 2) is sent to the Director of Medical Education (DME) at each hospital where graduates take their training. The DME is asked to forward the evaluation form to the staff physician who had the primary responsibility for evaluating the house officer throughout the previous year.

In order to summarize the evaluation of students' performance in the first year of graduate training, a Clinical Composite Index (CCI) was derived by means of multiple linear regression analysis in which the 16th item (overall MD potential) was regressed on the first 15, and the step down method* was used to decide which of the 15 items to eliminate.

This analysis was based on data for students (N=288) from the combined graduating classes of 1971 and 1972. These graduates were assumed to be relatively homogeneous in that all had completed the old curriculum, four year program at Minnesota. Data for transfer students and three-year graduates were eliminated in the interest of maintaining this homogeneity.

The variables and corresponding regression weights resulting from this analysis are given in equation 1 of Fig. 2. In summary, the items in descending order of contribution to the CCI are: medical knowledge, initiative on ward, appropriateness of therapy, rapport with patients, histories, carries out assigned tasks, case presentations, use of library, and emotional stability.

Seventy-six percent of the variance of the 16th item was accounted for by these 9 weighted variables. In comparing subjects' (N=288) predicted with actual ratings on the 16th item, we found that 83% of the predicted scores were within ± 0.5 of the actual ratings (on a 4 point scale). We feel that in representing the evaluator's true assessment of the students' performance, the predicted score, i.e., the CCI, provides a more comprehensive and refined measure that does the rating on the 16th item alone.

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*The step down method consists of calculating the regression of the 16th item on the first 15, computing the contribution of each of the 15 variables, and omitting the variable that contibutes least to the correlation between actual and predicted scores. This process is reiterated until the largest possible correlation is achieved with the fewest possible variables (3).

Since the curriculum change and the three-year program were implemented simultaneously at Minnesota, we felt that data based on new curriculum three-year graduates could not be readily compared with that of old curriculum four-year students. Despite this precaution, however, it would seem that the preliminary use of the regression weights derived from the old curriculum subjects might prove useful as an interim means of examining the CCI for three-year students. (The possibility of computing regression weights soley on the basis of data from new curriculum, three-year graduates was ruled out since there were 15 original variables and only 23 subjects.) Data for new curriculum four-year graduates are in the process of being gathered and are therefore not available at this time.

Characteristics and Internship Performance

The initial three-year class at Minnesota consisted of 31 students who graduated in June 1972. As reported elsewhere (2), comparisons between these students and their four-year classmates showed no differences upon entrance to medical school on demographic or academic variables with the exception of age and some personality variables. During their tenure in medical school, the two groups did not differ in academic achievement (based on course exams and National Board scores), nor, as described in another report (4), did the staff evaluations of the students' performance in clinical courses throughout the third-year differ greatly. In their transition to graduate training programs, the two groups exhibited some differences in the kinds of students who failed to match through the National Internship and Resident Matching Program (NIRMP). As described elsewhere (5), the three-year students who failed to match (N=5) were younger and tended to have higher scores on the National Board Parts I and II exams than did the three-year students (N=31) who did match. (The differences in National Board results did not reach statistical significance, however.) All who failed to match (N=5) chose to continue in medical school for a fourth year and subsequently, all successfully matched through NIRMP in a rotating or straight medicine internship. In contrast, the four-year graduates who failed to match (N=14) did not differ in age from their classmates who matched, and the unmatched group had significantly lower scores in some second year courses and on some portions of the Parts I and II exams.

Complete data for first-year internship/residency performance are available for 23 of the 31 students who graduated in three years. The sample of 23 is representative of the larger group of 31, and the remainder of this discussion will focus on these students for whom internship/residency data are available.

All but one of the 23 students who graduated in three years were male. The majority had attended either the state university or a private college in Minnesota and most had a science or pre-medicine major. Two students were admitted to medical school without having completed a BA or BS and two others had earned a masters degree. The majority had not had any work experience in a medical setting before their entrance to medical school, but over half had had some research or teaching experience. None of the fathers and one of the mothers of the three-year students were physicians, as compared with 15% of the fathers and none of the mothers of the four-year graduates. Thus we cannot assume that the three-year students had an advantage over their four-year classmates by virtue of early exposure to medicine through previous experience or parental role models.

In their choice of graduate appointments, the majority of three-year students (N=23) entered either a rotating internship (30%) or a program in a primary care area: family practice (26%), medicine (26%) or pediatrics (4%). The remaining 13% chose surgery. One year later, their classmates followed a similar pattern in their choice of a rotating internship (27%) or a graduate position in medicine (26%), pediatrics (7%), or surgery (10%). Proportionally fewer of the four-year graduates selected family practice (17%), and a minority of the group entered areas not chosen by the three-year graduates: psychiatry (5%) obstetrics/gynecology (2%), or patnology (5%). One might speculate that the elimination of the free-standing internship in 1975 will have a differential effect on the distributions of three and four-year students in graduate programs. Whether this will be beneficial to the future health care delivery system remains to be seen. Geographically, a greater proportion of three-year students (70%) entered graduate programs in Minnesota than did their four-year counterparts (60%).

The evaluation of first year of internship/residency performance for the three-year graduates (N=23) was in the range of "very good". The mean CCI was 2.2176 with a standard deviation of 0.7554, based on a scale of 1=outstanding, 2=very good, 3=adequate and 4=below adequate.

Inspection of the individual 16 items (see Fig. 2) showed that students were rated most favorably on item 9, "carries out assigned tasks (responsible, reliable)", with an average rating of 2.00, and least favorably on item 10, "use of library, literature in the study of patient's problems".

The data for individual students show some interesting variations especially in the comments that staff physicians wrote for 14 of the 23 graduates. Four students were singled out as "excellent" or "superior", two of these were in a rotating internship and one each in family practice and medicine. At the opposite end of the continuum one student experienced sufficient difficulty in a year long surgery residency that the majority of the attending staff questioned whether or not he should receive the internship certificate. The individual's problem was judged to be primarily one of emotional maladjustment in the opinion of the staff person who wrote the evaluation report. In two other cases, one in a pediatrics residency and another in a rotating medicine internship, the evaluators noted that the students were initially immature or had a slow start; however, both were reported to have improved after a short period of time. In general, the ratings indicate that the three-year students were performing more than adequately during their first-year of graduate work.

A preliminary report such as this is tantalizing in that the objective and subjective data combined provide enough feedback to indicate areas of strengths and weaknesses of individual students, but not enough information on which to base decision making for the group as a whole. Certainly the addition of comparable data for four-year graduates will provide needed perspective to these results for three-year students.

Our plans for future research include further psychometric work with the 16-item evaluation form from which the CCI is generated. We also plan to examine different CCI regression weights for each speciality and/or to compare 3 and 4 year graduates' performance separately by speciality.

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FIGURE 1

Categorization Scheme for Three Year Curricula

	Regular Curriculum	Optional Curriculum	
		Student Self Selection	Selection by Others
Content Reduced		U of Minn. Minneapolis	
Time Compressed			

FIGURE 2

COMPOSITE RATING OF CLINICAL PERFORMANCE

Student's name _____

Course _____

University of Minnesota
Medical School

Instructions: Rate the student on each of the 16 areas listed below. In your rating, compare him/her with all students you have taught in similar clinical settings. The adjectives in parentheses are intended as guides in rating each area.

Use the following scale:
1 = Outstanding (Excellent)
2 = Very good
3 = Adequate (Average)
4 = Below adequate
9 = Cannot Rate or Not Applicable

	RATING	COMMENTS
BASIC SKILLS		
1. **Rapport** with patients	____	
2. **Histories** (thorough, appropriate)	____	
3. **Physicals** (thorough, appropriate, technically competent)	____	
4. **Patient records** (accurate, well organized, clear)	____	
5. **Synthesizes information** (to make a comprehensive assessment of patient's problems)	____	
6. **Appropriateness of lab tests**	____	
7. **Appropriateness of therapy** or treatment program	____	
8. **Case presentations** (complete, organized, clear)	____	
9. **Carries out assigned tasks** (responsible, reliable)	____	
10. **Use of library, literature** (in study of patient's problems)	____	
OVERALL ABILITIES, ATTITUDES		
11. **Initiative** on ward (self starter)	____	
12. **Emotional stability**	____	
13. **Appearance**	____	
14. **Relationship** with ward team	____	
15. **Medical knowledge**	____	
16. **Overall M.D. Potential** (ability, judgment, attitude)	____	

NAME OF RATER _____ DATE _____

TITLE OF RATER _____

Equation 1. Clinical Composite Index

$$CCI = (.18\ X_1) + (.11\ X_2) + (.18\ X_7) + (.05\ X_8) + (.07\ X_9) + (.05\ X_{10}) + (.05\ X_{12}) + (.25\ X_{15}) - (.32)$$

where

CCI = Clinical Composite Index, which is the predicted rating on the 16th item

X_j = the jth (j=1,15) variable from the evaluation form, e.g., X_1 = Rapport with patients; X_2 = Histories, etc.